

## A SURVEY OF FERAL GOATS ON THE Oa PENINSULA, ISLE OF ISLAY, WESTERN ISLES, SCOTLAND, JULY 2003

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### ABSTRACT

An observational survey of feral goats was conducted on The Oa peninsula of the Isle of Islay, Scotland, between 6<sup>th</sup> and 17<sup>th</sup> July 2003. Approximately 400 (+/- ca30-40) goats were recorded in 45 groups varying in size from 1 to 44 individuals. Most groups were recorded within less than 500 metres of the coast where they regularly found shelter amongst rock-falls and in various caves in the cliffs. White, black and brown were the most frequently recorded coat colours, followed by a combination of white/beige. Horn characteristics of adult billies, evidence of tagged individuals, and accounts of local farmers, suggest that this goat population has arisen from several sources on several occasions.

The total number of goats recorded during this survey is similar to a count obtained in 2000, but considerably larger than all previous counts obtained for the area between 1981 and 1998. Despite an annual cull of between 40 and 50 goats being conducted for landholders on the northern half of The Oa since 1997, the population still appears to be increasing.

This paper provides a relatively detailed baseline against which future systematic counts of goats on The Oa may be compared.

### INTRODUCTION

Feral goats, *Capra hircus*, originating from local domestic animals, have been established along the coastal cliffs and adjacent moors and grasslands of the Scottish island of Islay for at least a century, and probably for considerably longer. These goats occur in four discrete areas of the island. The largest sub-population is on The Oa peninsula (locally referred to as "The Oa") at the island's southern extremity. The next largest is on the north-eastern portion of the island, east and north-east of Gortantaoid Point and mostly north-west of Bunnahabhain. Another occurs on the Rhinns of Islay – the island's south-western peninsula. A fourth small sub-population occurs in the Smaull Farm to Sanaigmore (to Ardnave Point) area on the north-western corner of the island. In addition, a population of feral goats occurs on the small island of Texa that lies about 600m off the south coast of Islay and 4km to the east of the Oa peninsula.

Following the recent acquisition of Kinnabus Farms to add to its other reserve holding of Upper Killyan Farm on The Oa peninsula, the Royal Society for the

Protection of Birds (RSPB) had gained ownership and management responsibility for approximately the south-western half of the peninsula. The Oa Reserve has been established primarily for the conservation of choughs, *Pyrrhcorax pyrrhcorax*, which have their largest breeding population in Britain here on the Isle of Islay.

The survey described below was undertaken to determine the current distribution and relative abundance of feral goats on The Oa, as a basis for determining future management requirements and options on this newly enlarged, 1,883 hectare reserve. Information was also sought to determine current distribution and abundance of goats on other parts of Islay and on the nearby island of Texa.

### METHODS

#### *The survey area*

The Isle of Islay (lat. 55° 45' 20" N; long. 06° 15' 20" W) is the most southerly of the Western Hebridean Isles of Scotland and lies approximately 23km west of the Scottish mainland (see Fig. 1). It is a large island, measuring approximately 40 km from north-to-south and 30 km from east-to-west, but is almost dissected, as shown in Fig. 1, along its north-south axis by Loch Gruinart from the north and the wider intrusion of Loch Indaal and Laggan Bay from the south.

Islay experiences an Atlantic seaboard climate described as "hyperoceanic, humid, temperate - 01 H3 T1" (see MacKay, 1996). Figure 2 plots mean monthly rainfall and mean monthly maximum temperatures, as recorded at the meteorological recording station on Islay between 1983 and 1987 - the recording station closed at the end of 1987. Mean annual rainfall for the period was 1,043 mm (range 975-1103mm) over the five-year period. The months from September - January tend to receive more rain than the other months, but the pattern is very variable. Temperatures are lowest between November and March, although the pattern for this is also variable. Sea fog often obscures visibility at altitudes above about 100m even during summer months (including on one day during this survey). The high sea-cliffs rising 1-200m above sea level add a significant level of wind-chill to minimum temperatures. Winter gales are common, with strong winds predominantly from the SW quarter.

The Oa peninsula is the oval-shaped, southern-most promontory of the Isle of Islay and is situated immediately to the west and south-west of the town

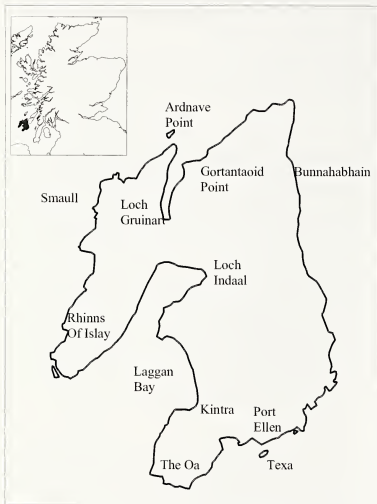


Figure 1. Map of the Isle of Islay, with inset showing location relative to the Scottish mainland

of Port Ellen (Fig. 3). It measures nearly 8km east-to-west, 8.5km north-to-south, covers approximately 47 km<sup>2</sup>, and has a ('smoothed') coastal circumference of ca 26km. The Oa is mostly a gently undulating, hilly landscape with the highest point, Beinn Mhor, rising to 202m. It is covered mostly by heather moorland and improved and semi-improved pasture, and fringed by coastal cliffs, steep grassy slopes and numerous rocky coves (see Ordnance Survey "Pathfinder" map 439 (NR 24/34/44) "Port Ellen" for details). The Oa reserve consists of approximately 800ha of dry heath / acid grassland (42%), 650ha of coastal grassland / heath (35%), 350ha blanket bog (19%), 65ha of improved grassland (3%), 5ha of arable land and 13ha of standing water (RSPB, unpublished report 2002; but see also Madders, et al. 1998). Scattered around the coastline are many caves of varying dimensions, mostly former sea-caves with entrances at, or near, the cliff-base and indicative of former relatively higher mean sea levels.

The Oa reserve has been used for grazing of mixed, traditional suckler-type cows and of Highland black-faced sheep. Such grazing will be retained by RSPB to maintain and improve the grassy pastures as feeding habitats for chough (see Madders, et al. 1998; Finney and Jardine 2003) and other farmland birds of conservation concern. However, numbers of both sheep and cattle have been reduced significantly on The Oa in recent years and future management may require changes in grazing regimes (grazing species, density, frequency, timing) in key management zones to achieve particular conservation outcomes. The role that grazing and browsing by feral goats may play in this is yet to be determined.

#### Survey Methods

The coastal perimeter of The Oa peninsula was surveyed on foot, searching for individuals or groups of feral goats both on the cliff-slopes and inland. High vantage points with clear views over large areas were sought first to note the positions of distant groups and how best to approach these. Visibility was generally very good for locating goats, due to the vast areas of very low vegetation and the starkly contrasting colours of the goats' pelage. The significant exceptions to the good visibility were numerous, mostly fairly small, areas obscured by topographic features such as ridges and gullies. These were searched fairly systematically, although some small areas were inevitably missed. Also, a few areas of tall bracken were searched carefully as small numbers of goats were occasionally hidden within them. One of us (DJM) is familiar with these areas of cover often used by goats on The Oa, and has regularly stalked and culled small numbers of goats there for the local farmers and for occasional trophy hunters.

When goats were located, an initial count was obtained. Then group composition, based on the numbers of adult males (billies), adult females (nannies) and kids was recorded, with 'yearling' and younger kids separated where possible. Where distant groups disappeared from sight before all group characteristics could be recorded, total counts were obtained as a priority and then numbers of 'obvious' adult males were noted. The composition of a small number of groups was therefore insufficiently known and a minimum number of adult males were recorded. These groups are marked with an asterisk in the summary table (Appendix 1). In these situations all other goats were recorded as "adult females +/- kids". Consequently, the numbers of adult males is likely to be a slight under-estimate and the numbers of adult females +/- kids a slight over-estimate.

An attempt was also made to identify particular groups based on coat colours and coat patterns, and on the size and shape of the horns of particular adult males. No attempt was made to classify the age of individual goats based on horn ring counts (after Bullock and Pickering 1984). This would have

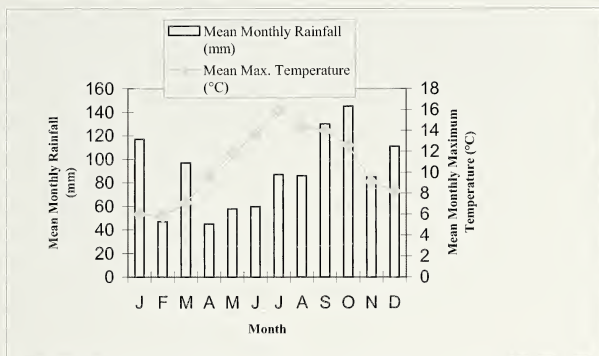


Figure 2. Climatic conditions. Isle of Islay.

required far longer than time permitted for this general overview survey.

Coat colours recorded were simplified to black (B), white (W), brown (Br) and beige (Be), and predominant combinations of these (e.g. B/Br, B/W, etc.). Although scoring of these colours and combinations was, at least in part, subjective, it nevertheless provided a useful cue for recognition of particular groups.

The whole survey was conducted from 6<sup>th</sup> to 17<sup>th</sup> July 2003. One or two people with binoculars and a telescope, and two to four other observers, walked close together at all times, except when goats needed to be 'flushed' from cover back in the direction of the main recorder(s). The weather was clear on all but one foggy day when only a short stretch of coastline around Glen Astle was searched. Wherever possible, searching was carried out into the wind, so that goats could be approached as closely as possible.

On the evening of 16 July, four people conducted a survey of the feral goats on the uninhabited isle of Texa. The goats have been present on this low, hilly island of approximately 60ha for many decades. The numerous hillocks and, in some places, tall bracken, obscured visibility of several areas of the island, especially in the north. But the hillocks also provided excellent vantage points for observing goats once they were located and 'driven' into open areas. A find-flush-and-count method was therefore used for this survey.

Approximate numbers of goats present in other areas of Islay were obtained from knowledgeable local residents, to provide as complete a view of feral goat numbers and distribution across the island contemporaneous with that obtained in this more detailed survey on The Oa.

## RESULTS

The locations, relative sizes and composition of groups of feral goats encountered during this survey on The Oa are shown in Figure 4. From this it is clear that the goats occur predominantly along the coast and for only short distances (up to 1km) inland. It is also evident from this plot that the groups are clumped in particular areas.

Minimum numbers of goats observed, by sex and by relative age (young kids up to about 4 months old, 'one-year-old' kids actually about 6-8 months old, and adult females and adult males) are summarised per group recorded in Appendix 1.

A total of 432 goats were recorded in 46 groups, although one of these groups of 12 individuals was definitely seen and scored twice. Thus a maximum of 420 goats were observed in 45 groups. These groups included:

- at least 166 billies within 27 groups,
- a maximum of 204 nannies within 34 groups,
- at least 49 "year-old" kids within 28 groups
- only three young kids within three separate groups.

Group size (see Fig. 5) ranged from one to 44 individuals (mean 9.8 goats; n=45). Twenty-three percent of groups were all-male groups and ranged in size from three to 11 individuals (mean 6.0; n=10). Thirty-five percent of groups were female +/- kid groups and ranged in size from one to 23 individuals (mean 5.1; n=16). Forty-two percent of groups were mixed sex groups, ranging in size from five to 44 individuals (mean 15.8; n=19).

#### **Interpretation of data**

The number of adult females recorded was greater than for adult males (0.55:0.45), although there was almost certainly an over-count of females and a corresponding under-count of males, due to the rapidity with which three groups disappeared from sight and the consequent method used to record group composition. When these groups are removed from this part of the analysis, the sex ratio becomes 0.48:0.52.

As the counts in the present survey were performed over several days and there appeared to be some fluidity between groups (e.g. some groups divided or amalgamated as they grazed or as they returned to their shelter sites late in the day), the count data presented are likely to include some 'double-counting' of individuals. This is most likely to have occurred within the area between Dun Athad, just east of The Mull of Oa, and Stremnishmore, because different counts were made along partially-overlapping areas of this section on at least three separate days, over an eight day period. However, it is thought that this is unlikely to represent more than about 30 to 40 individuals of the 60 counted in this area on 7<sup>th</sup> July (see Appendix 1). In addition, a group of 12 is also known to have been counted twice between The Mull of Oa and Lower Killeyan (as already mentioned), but this has been accounted for in the total.

Any double-counting is also likely to be countered by the possible lack of sighting of a group of 40-60 goats that are considered by one of us (DJM), and by Hamish McTaggart the owner of Kintra Farm (pers. comm.), to be 'resident' on Kintra Farm. On the day that Kintra Farm was surveyed, and also on the day before, the property had been quartered on quad bikes to find and muster all sheep for their annual wool clip. As a consequence of this, the local group(s) of goats may have moved elsewhere, and only eight goats were seen on this property despite considerable search effort. Numbers seen immediately to the south of here were not particularly high, and were not higher than might have been expected from local accounts.

The coat colours and patterns of the goats were many and varied and careful noting of these would greatly enhance future identification of individuals, or at least some individuals within particular groups or areas. While the scoring of coat colours in this survey was simplified to either predominant colour or a

combination of the two predominant colours, this was still a useful practice for attempting to distinguish groups, especially when combined with each animal's sex. The relative frequencies of predominant coat colours by sex are summarised in Fig. 6. White is the most frequent coat colour among both male and female goats on The Oa. Black coat colour and brown were next most frequently recorded, followed by the combinations of white/beige and black/brown. A few individuals also had very distinctive coat patterns such as square patches or circular 'bullseyes' that allowed them to be identified immediately. Mature male goats on The Oa exhibit a variety of horn shapes. Many have the relatively simple, backward-curving, scimitar-type of horn. Others have an additional outwards curve, while still others curve, or flair, outwards at least twice, with some spiralling of the horns. These characteristics add considerably to the observer's ability to identify individual animals.

#### **b) Comparison of counts of feral goats on The Oa with other areas on Islay**

Table 1 below summarises counts, or recent estimates, of feral goat numbers on other parts of Islay, and on the isle of Texa. It also compares the current survey counts with those of previous counts conducted on The Oa.

While the current survey is almost certainly the most thorough undertaken on The Oa, it is worth noting the much higher numbers recorded in this area over the last decade. Also of note are the lower counts on The Oa in 1985, indicating either a population decline following the earlier 1980s counts, or the difficulty of locating all goats along this complex coastal landscape.

#### **(c) The Isle of Texa**

A total of 84 goats were counted on the isle of Texa during this survey. They were all in a single large tribe consisting of 41 adult males, 32 adult females and 11 kids.

## **DISCUSSION**

#### **a) The Oa Peninsula**

##### *Population size and group composition*

In July 2003 there were approximately 400 (+/- ca 30-40) feral goats living on The Oa peninsula of Islay. This total is very similar to that obtained by Angus Keys (local reserves manager, RSPB, personal communication) during a seabird census around the coastline of The Oa (from a boat) in 2000 (see Table 1).

Approximately even numbers of adult males and females were recorded. However, it should be noted that considerably more adult males than adult females (ca 170 cf. 80) have been culled from the population between 1997 and 2003 (DJM, unpublished data). Goats have been culled on The Oa each year since 1994. Initially only very small numbers were removed from the population. However, with the exception of 1998 (when 10 goats were culled),

between 40 and 50 goats have been culled there annually since 1997. These culls have usually consisted of four to six adult billies and about 35 to 40 adult nannies and kids.

Fifty-two first-year kids were identified in the count, representing at least 12% of the counted population, although this may also be an under-estimate because many were of a comparable size with adult nannies. A small number may therefore have been classed as adult nannies when seen only at briefly.

A total of 45 groups of feral goats were counted, ranging in size from one to 44 individuals. The mean group size of 9.8 animals is considerably larger than the mean group size of about 5 animals in July recorded on nearby Rum (Shi, et al. (b) in press). However, this latter study involved a much larger sample size over a far greater time span.

The study on Rum (Shi, et al. (a) 2003 and (b) in press) showed that group size varies with time of day, generally decreasing as the goats divided into smaller feeding and social groups as they move away from their night caves and increasing again as the goats return to their night shelters. Most groups observed during the survey of The Oa, were recorded between the hours of 10:30 and 18:00. It is therefore likely that fewer, but larger, groups might have been encountered if the survey was undertaken earlier in the morning and later in the afternoon.

Group size and composition also vary throughout the year on Rum, with the percentage of mixed-sex groups increasing sharply during the rut in August and September, and being at its lowest from April to July (Shi, *et al.*, (b) *op. cit.*). Outside of the rut, the frequency of female groups is usually greater than male groups and mixed-sex groups. The relatively high proportion of mixed-sex groups recorded during this survey on The Oa during late July may be indicative of the approaching rut.

#### **Distribution on The Oa**

Most goats on The Oa were observed on, or near the coastal cliffs, and mostly less than 500m inland. Several local residents observed that goats headed for the coastal cliffs at the onset of bad weather. Also, during this survey, most goat groups that were disturbed by our presence, usually headed for the coastal cliffs and rocky bays that were within close proximity. Closer examination of the coast revealed that these favoured areas have substantial rock overhangs and former sea caves (from periods of higher relative sea levels) in which the goats clearly seek regular refuge. All shelters had deep deposits of goat droppings on their floors and strong odours of goats prevailed. Impressive examples of these shelters occur in the two bays to the east of Dun Athad and on the south side of the bay at Glen Astle. The goats also shelter amongst and behind some of the larger rockfalls on cliff-slopes and at the cliff-bases.

#### **Coat and Horn Characteristics**

The diversity of coat colours and patterns, and adult male horn shapes, observed in The Oa goat population suggest that the population has arisen from several sources. Local residents reported that domestic goats were likely to have escaped or been released at various times over the past 100 or more years. Certainly, there appear to be some goats with 'ancestral' features, including billies with simple, long, scimitar-shaped horns, that may have arisen from older "Scottish-type" stock (see Whitehead 1972). Others have features, such as wider-sweeping, spiralled horns more characteristic of the more recently introduced angora-type goats. While these latter goat traits may have been introduced to The Oa population on more than one occasion, and over a longer period than just two or three decades, three local residents reported that 'angora-type' goats had escaped from a goat farm near Kilnaughton Bay, on the north-eastern portion of The Oa, over the past 20 years or so, and that several had also been deliberately released near The Mull of Oa in about 1995. These accounts are supported by the observation of at least two goats with orange ear-tags seen annually between 1999 and 2002 by RSPB reserve manager, Angus Keys (pers. comm.).

#### **Population Trends**

While the data presented here are insufficient to examine population growth trends, there is circumstantial evidence that The Oa goat population is increasing. Firstly, the highest counts (and by a substantial margin) have been recorded in recent years (see Table 1). Secondly, several local residents made the observation that goats are now seen further inland than previously - up to as much as 2km inland in the summer months - and that they have even been seen occasionally on the western outskirts of Port Ellen in the last two to three years. Farmers on The Oa also claim that more goats are being seen than ever before. Interestingly, this is in spite of the numbers of goats that have been culled on farms on both sides of the peninsula, each year since 1994.

Dunbar, Shi, Buckland and Miller (unpublished observations) and Dunbar, Buckland, Miller and Coldbeck (unpublished observations) have shown that the feral goat population of the Isle of Rum - just 120 km north of Islay - appears to be controlled largely by extreme climatic conditions and that population growth is limited mostly by the amount of shelter available in caves and rock shelters in the coastal cliffs. Dunbar, Shi, Buckland and Miller (unpublished observations) have examined climatic influences on the activity budgets of the feral goats on the Isle of Rum and the consequent implications of this for population dynamics under climate change. From this work, they concluded that a mean monthly windchill-adjusted temperature of 5°C appeared to be a critical threshold in terms of the goats' ability to survive and that caves and other sheltered sites were

an essential component of the animals' survival strategy under such conditions because they effectively raised ambient temperatures for the goats. Climatic conditions on The Oa are generally less severe than on the Isle of Rum, due primarily to The Oa's lower altitude (200m compared with 400m). Mean monthly rainfalls are also considerably less on Islay (about a third less in most months) and mean monthly temperatures are about 1-2°C warmer. It therefore seems likely that the climatic limitations on the goat population on The Oa may be significantly less than on the population on the Isle of Rum and that the population on The Oa may be increasing.

The feral goat population on The Oa may therefore provide an interesting basis for a comparative study of population growth rates and controlling influences when contrasted with population data from the Isle of Rum, or elsewhere.

#### ***Future management of the feral goat population on The Oa peninsula***

Madders, et al. (1998) have shown that choughs foraging on The Oa peninsula select grassland habitats to feed in. They showed that in December-February choughs forage preferentially in acidic grasslands and improved grasslands of inland areas. However, in July-September, when the choughs are distributed mostly around the coastline (and have nests mainly in coastal caves), Madders, et al. (1998) showed that they forage preferentially in neutral (dune) grasslands and on cliffs and slopes.

Bullock, et al. (1983) have demonstrated the importance of grazing herbivores to chough feeding ecology, through maintaining the grass sward at a height short enough to allow choughs access to soil invertebrates, while dung beetles (*Aphodius*) found in the faeces of cattle and sheep (and presumably goats) represent an important additional source of prey (Madders, et al. 1998). Shorter swards, as well as areas of bare soil, bare rock and dung, also benefit other thermophilic invertebrates, such as the yellow mound ant (*Lasius flavus*), which the choughs can feed on (D. Beaumont, RSPB reserves ecologist, pers. comm.).

Feral goats are now the major vertebrate herbivores with access to the coastal cliffs and the vegetation adjacent to cliff-tops on The Oa peninsula on Islay. Domestic livestock (sheep and cattle) numbers have been reduced significantly on the peninsula in recent years and their access to the dangerous cliffs is now either excluded (in several areas), or is managed carefully to minimise the risk of livestock losses through misadventure.

Browsing and grazing by the goats is therefore the main way that the short sward and floristically diverse vegetation of the cliffs and cliff-top pastures may be maintained, and also potentially expanded in future. In the absence of such ongoing grazing and browsing it is likely that such areas may become colonised by

taller, denser, woody perennial shrubs such as heather, willow and bracken.

In addition, the likely high production and at least occasional mortality of feral goat kids will provide prey and carrion for birds such as golden eagle and raven.

Each of these considerations needs to be weighed against other possible conservation outcomes, the potential for degradation of some areas through impacts of too many goats should their population continue to expand, and the affects that annual culling of goats on The Oa peninsula may have on a range of other land management objectives.

#### ***b) Other Areas***

By comparison with the population on The Oa, feral goat numbers in the north-east, north-west and south-west of the island appear to be considerably smaller. There is insufficient evidence on which to base any conclusion about population trends in these areas. However, more recent figures for both the north-west and the north-east of the island are higher than previous counts or estimates. Closer assessment is needed.

The goat population on the small isle of Texa is interesting for two reasons. Firstly, at the time the survey reported here was undertaken, all 84 goats counted were in a single tribe on the north-western corner of the island. Secondly, these goats apparently supplement their diet with kelp (DJM personal observation).

The relatively larger proportion of adult males to adult females in this population (41:32) may, at least in part, be attributed to some recent population management through culling of some adult females.

As with The Oa population, at least one female goat in the Texa population was noted to have a red ear-tag, suggesting that someone has introduced goats here in the recent past (or, less likely, that someone has been catching and tagging goats on the island).

#### **CONCLUSIONS**

The present study has raised more questions than it has answered. The feral goat population on The Oa appears to be increasing in both abundance and range, though this will need to be monitored, using this summary paper as a base-line.

There appear to be some significant similarities and some significant differences between the goat populations on The Oa and on the Isle of Rum. The Oa goat population may therefore provide an interesting and very instructive comparison with the data obtained on Rum – if researchers choose to establish a research program on The Oa.

It is likely that the goat population on The Oa will require ongoing management for both farming and conservation purposes. Any population research that follows this initial baseline survey should help to define what that management should be and where and when it should be applied to best effect.

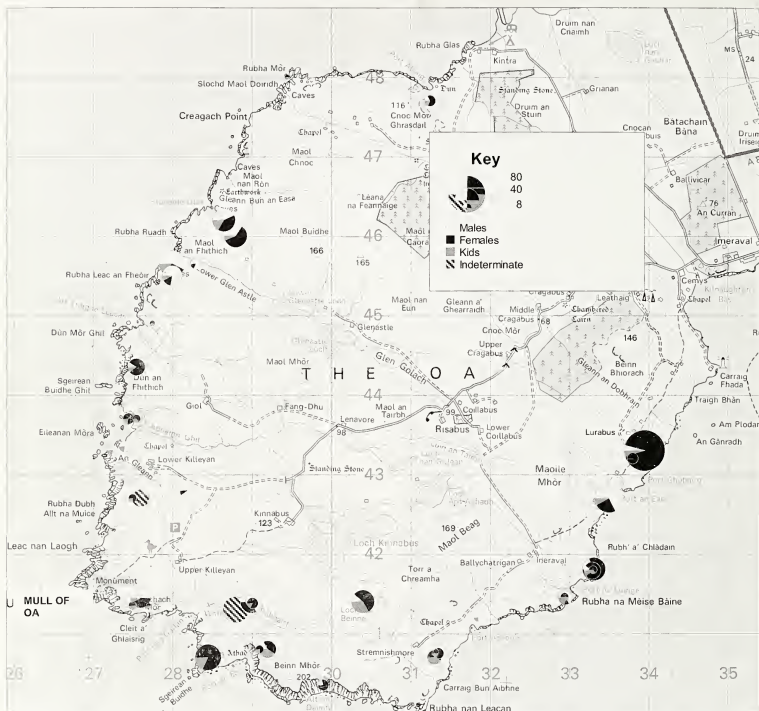
### ACKNOWLEDGEMENTS

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Figure 3. The Oa peninsula, Isle of Islay, Scotland, showing place names referred to and indicating the distribution and relative size and composition of feral goat groups observed during July 2003.



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Figure 4. Feral goat group size (numbers of goats). The Oa, Isle of Islay – July 2003.

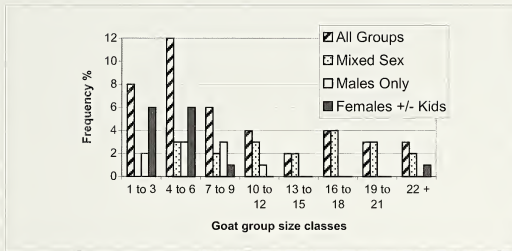


Figure 5. Feral goat colour frequencies. The Oa, Isle of Islay – July 2003.

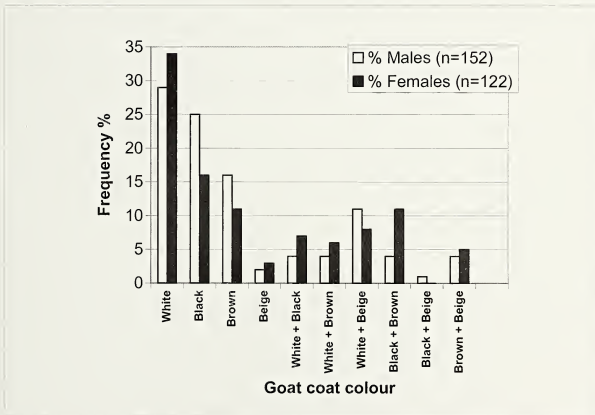


Table 1. Comparison of counts of feral goats made on the Scottish Isle of Islay since 1981.

Location	Date	Count / Estimate	Comment
The Oa peninsula	April 1981	123	Malcolm Ogilvie, (pers. comm.)
	Aug. 1983	101	Malcolm Ogilvie, (pers. comm.)
	1984	100-150	Newton (1984)
	Aug. 1985	59	Malcolm Ogilvie, (pers. comm.); island-wide survey
	1998	ca 300	Donald James MacPhee during island-wide deer census by helicopter
	2000	ca 370	A. Keys, (pers. comm.)
	July 2003	ca 400	This survey
NE Islay	Aug. 1985	163	Malcolm Ogilvie, (pers. comm.); island-wide survey
	July 2003	ca 180	Donald James MacPhee
NW Islay	Aug 1985	32	Malcolm Ogilvie, (pers. comm.); island-wide survey
	July 2003	ca 40	Donald James MacPhee
SW Islay	July 2003	ca 70	Donald James MacPhee